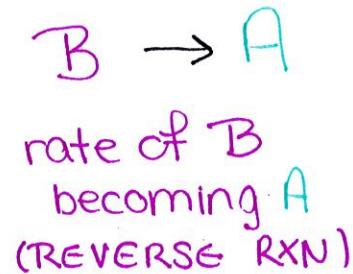
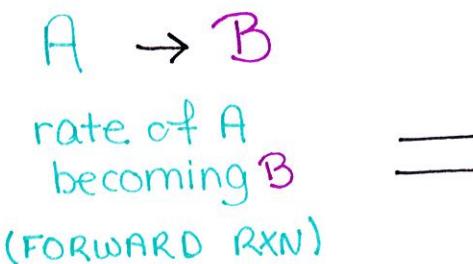


Equilibrium



write as a single equation



Reversible Reaction

Dynamic Equilibrium

State of balance when the rate of the forward reaction EQUALS the rate of the reverse reaction

- At equilibrium, the concentration (amounts) of reactants & products does NOT change!
- If the forward rxn is exothermic, the reverse reaction is endothermic & vice versa.

Le Châtelier's Principle

The position of equilibrium will shift to oppose a change in reaction conditions.

(Heat is treated as a reactant (endothermic) or product (exothermic))

- 1) Remove a product \rightarrow equilibrium will shift right to make more product
- 2) Add a product \rightarrow equilibrium will shift left to get rid of extra product
- 3) Remove a reactant \rightarrow equilibrium will shift left to make more reactant
- 4) Add more reactant \rightarrow equilibrium will shift right to get rid of extra reactant

- 5) Add heat to an exothermic reaction $\rightarrow A + B \rightarrow C + \text{heat}$
shift equilibrium to the left to remove excess heat
- 6) Remove/cool down an exothermic reaction $\rightarrow A + B \rightarrow C + \text{heat}$
shift equilibrium to the right to make heat.
- 7) Add heat to an endothermic reaction $\rightarrow A + B + \text{heat} \rightarrow C$
shift equilibrium to the right to remove excess heat
- 8) Remove/cool down an endothermic reaction $\rightarrow A + B + \text{heat} \rightarrow C$
shift equilibrium to the left to make heat
- 9) Reaction involves gases?
Increasing Pressure will change equilibrium to the side that has smaller volume of gases
Decreasing Pressure will shift equilibrium to the side with a larger volume of gases.